

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 1529 (1971): Blast furnace refractories for steel plants
[MTD 15: Refractories]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS : 1529 - 1971
(Reaffirmed 1997)

Indian Standard

SPECIFICATION FOR BLAST FURNACE REFRACTORIES FOR STEEL PLANTS

(First Revision)

Fourth Reprint MARCH 1998

(Incorporating Amendment No. 1)

UDC 666.762-16:669.162.212.8

© Copyright 1977

**BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002**

Indian Standard

SPECIFICATION FOR BLAST FURNACE REFRACTORIES FOR STEEL PLANTS

(*First Revision*)

Refractories Sectional Committee, SMDC 18

Chairman

SHRI J. C. BANERJEE
107 C. I. T. Road, Belegkata, Calcutta 10

Members

Representing

CDR S. P. AGARWALA	Naval Headquarters
SHRI B. S. KAPUR (<i>Alternate</i>)	
SHRI T. R. ANANTHARAMAN	Hindustan Steel Ltd (Central Engineering & Design Bureau), Ranchi
SHRI B. RAMACHANDRAN (<i>Alternate</i>)	
SHRI R. V. BAINDOOR	Associated Cement Companies Ltd, Bombay
SHRI J. V. JOSHI (<i>Alternate</i>)	
SHRI I. B. BANERJEE	Hindustan Steel Ltd (Alloy Steels Plant), Durgapur
SHRI B. N. BHASKAR	Ishwar Industries Ltd, New Delhi
SHRI R. N. BHASKAR (<i>Alternate</i>)	
SHRI H. V. BHASKAR RAO	Bird & Co Private Ltd, Calcutta
SHRI A. SEN (<i>Alternate</i>)	
DR S. BHATTACHARYYA	Directorate General, Ordnance Factories, Calcutta
SHRI D. K. CHAKRAVORTY (<i>Alternate</i>)	
SHRI D. S. CHADIAL	Directorate General of Technical Development, New Delhi
SHRI D. K. CHATTERJEE	M. N. Dastur & Co (Private) Ltd, Calcutta
SHRI R. C. NANDY (<i>Alternate</i>)	
SHRI A. E. CRAWLEY	Indian Engineering Association, Calcutta
SHRI N. K. BHAMBHANE (<i>Alternate</i>)	
CHEMIST & METALLURGIST (SF),	Ministry of Railways
CHITTARANJAN LOCOMOTIVE WORKS, CHITTARANJAN	
DEPUTY DIRECTOR (MET-3),	
RESEARCH, DESIGNS & STANDARDS ORGANIZATION, CHITTARANJAN (<i>Alternate</i>)	
SHRI B. K. P. CHIBBAR	Bokaro Steel Ltd, Bokaro
SHRI M. H. DALMIA	Orissa Cement Ltd, Rajgangpur
DR J. D. PANDA (<i>Alternate</i>)	

(*Continued on page 2*)

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

(Continued from page 1)

<i>Members</i>	<i>Representing</i>
SHRI G. C. DAS	National Test House, Calcutta
DR S. S. DAS	Orissa Industries Ltd, Rourkela
SHRI K. K. PANDA (Alternate)	
SHRI M. H. GAJENDRAGADKAR	Hindustan Steel Ltd (Bhilai Steel Plant), Bhilai
SHRI S. K. MUKHERJEE (Alternate)	
SHRI ACHYUT A. GANPULE	Parshuram Pottery Works Co Ltd, Morvi
SHRI V. H. AGASHE (Alternate)	
DR S. S. GHOSE	Belpahar Refractories Ltd, Belpahar
DR A. K. BOSE (Alternate)	
SHRI R. K. GOVINDACHAR	India Fire Bricks & Insulation Co Ltd, Marag, Distt Hazari Bagh (Bihar)
SHRI S. K. BISWAS (Alternate)	
SHRI K. K. GUPTA ROY	Indian Iron & Steel Co Ltd, Burnpur
SHRI D. N. BANERJEE (Alternate)	
SHRI K. P. JHUNJHUNWALA	All India Glass Manufacturers' Federation, New Delhi
SHRI R. C. SINGHAL (Alternate)	
SHRI K. L. MATHUR	Bhupal Mining Works, Bhilwara
SHRI K. N. MATHUR (Alternate)	
DR H. K. MITRA	In personal capacity (P 16/1B, Keyata's Lane, Calcutta 29)
SHRI K. N. MUKHERJEE	Behar Firebricks & Potteries Ltd, Dhanbad
SHRI S. N. BANERJEE (Alternate)	
SHRI H. P. S. MURTHY	National Metallurgical Laboratory (CSIR), Jamshedpur
DR D. N. NANDI	Central Glass & Ceramic Research Institute (CSIR), Calcutta
SHRI N. B. CHATTERJEE (Alternate)	
SHRI P. S. NARAYANA	Engineering & Mineral Industrial Research Laboratory, Bangalore
DR B. RAO	Tata Iron & Steel Co Ltd, Jamshedpur
SHRI B. N. GHOSH (Alternate)	
SHRI D. S. J. RAO	Hindustan Steel Ltd (Durgapur Steel Plant), Durgapur
SHRI I. C. MODI (Alternate)	
SHRI D. K. RAY	Inspection Wing, Directorate General of Supplies & Disposals
SHRI B. B. BANERJEE (Alternate)	
SHRI D. R. SUBRAMANIAN	Burn & Co Ltd, Calcutta
SHRI K. N. MARWAHA (Alternate)	
SHRI P. S. SUNDARAM	Hindustan Steel Ltd (Rourkela Steel Plant), Rourkela
SHRI M. PRASAD (Alternate)	
SHRI R. K. SRIVASTAVA	Director General, ISI (Ex-officio Member)
Deputy Director (Struc & Met) (Secretary)	

Indian Standard

SPECIFICATION FOR BLAST FURNACE REFRACTORIES FOR STEEL PLANTS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 29 October 1971, after the draft finalized by the Refractories Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This Indian Standard was first published in 1961. As a result of experience gained during these years and the improvement in the manufacture of refractories with the development of blast furnace technology in the country, it has been decided to incorporate a new grade of fireclay refractories in this standard.

0.2.1 Acceptable limits for surface defects in blast furnace (proper) refractories have also been included in this standard. It should, however, be pointed out that surface defects, as far as possible, cover only those defects which could be judged by the naked eye and with the minimum use of complicated instruments.

0.2.2 Data is being collected with regard to the iron oxide (Fe_2O_3) content of the three types of blast furnace refractories and suitable stipulations will be made in due course.

0.3 This standard keeps in view the manufacturing and trade practices followed in the country in this field.

0.4 This standard contains clause 6.1 which calls for agreement between the purchaser and the manufacturer.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard covers the requirements for three types (*see* 5.1 and 6.1) of blast furnace refractories for steel plants.

2. GENERAL REQUIREMENTS

2.1 General requirements relating to the supply of blast furnace refractories for steel plants shall conform to the requirements laid down in IS : 1387-1967*.

2.2 The refractories shall be compact, of homogeneous texture and shall be reasonably free from cracks, voids and other flaws. They shall be burnt evenly throughout and shall have sufficient mechanical strength and no soft corners. Bauxite shall not be used in the manufacture of these refractories.

2.2.1 The maximum permissible limits for surface defects in blast furnace refractories shall be as specified below:

- a) *Chipped corners* — Not more than 3 mm in depth for bottom blocks and not more than 5 mm in other bricks should not be considered for rejection. The maximum number of chipped corners in any individual block shall not exceed two.
- b) *Chipped edges* — Not more than 3 mm in depth for bottom blocks and not more than 5 mm in depth in other bricks, and not more than 15 mm in length should not be considered for rejection. The maximum number of chipped edges in any individual block shall not exceed two.
- c) *Cracks* — Cracks up to a width of 0.25 mm and not forming net work all over the surface of the brick will be acceptable irrespective of the number of such cracks. No crack of any size running on a face from end to end will be acceptable.

Cracks having a width not more than 0.5 mm and length not more than 15 mm are allowed provided number of such cracks is not more than 3 on a brick.

- d) *Slag and iron patches* — Discolouration on the surface of the bricks will not be a criteria for rejection provided there is no hole at the discoloured area. Slag and iron patches having a hole of 3 to 4 mm diameter on all sides will not be a criteria for rejection provided they are not more than 5 in number in a brick. Slag and iron patches having a hole of up to 3 mm diameter will not be considered for rejection, and above 4 mm will be considered for rejection.

*General requirements for the supply of metallurgical materials (*first revision*).

e) *Warpage* — The following maximum warpage allowance will be provided to a brick having maximum weight up to 20 kg:

- 1) Bricks having a maximum weight up to 20 kg, length up to 350 mm and thickness ranging from 75 to 100 mm will be considered for rejection provided the warpage is more than 1 mm.
- 2) Bricks having weight of more than 20 kg or dimensions being out of the above specified measurements will have warpage as agreed to by the manufacturer and the purchaser.

f) *Grinding* — Grinding of bricks should not be a criteria for rejection.

NOTE — To facilitate measuring accurately the chipped corners and chipped edges covered under items a) and b) above, details of typical instruments used for this purpose are given in Appendix A.

3. SAMPLING

3.1 Representative samples shall be drawn according to the scheme of sampling given in IS : 1528-1962*.

4. TOLERANCE ON SIZE

4.1 Variations from specified dimensions covering both warpage and shrinkage shall be allowed as per consumer's requirements. The bricks and blocks to be used as bottom lining shall also be gauged by the manufacturers as per the requirements of the consumers.

5. CHEMICAL COMPOSITION

5.1 Alumina and titania content when determined in accordance with the methods given in IS : 1527-1960† shall be as follows:

	<i>Type 1</i>	<i>Type 2</i>	<i>Type 3</i>
Al ₂ O ₃ , percent, <i>Min</i>	42	36	30
TiO ₂ , percent, <i>Max</i>	—	2.5	—

NOTE — The alumina content may also be determined according to the methods given in IS : 1335-1959‡.

*Methods of sampling and physical tests for refractory materials. (Since revised and split into various parts).

†Methods of chemical analysis of fireclay and silica refractory materials. (Since revised).

‡Methods for the direct determination of alumina in refractory materials (*tentative*).

6. PHYSICAL TEST REQUIREMENTS

6.1 The blast furnace refractories when tested according to the methods given in IS : 1528-1962* shall conform to the following requirements:

	Type 1	Type 2	Type 3
Pyrometric cone equivalent, ASTM Cone No., <i>Min</i>	33	32	31
Refractoriness under-load, <i>Min</i> t_1 , °C	1 520	1 450	1 360
Cold crushing strength kgf/cm ² , <i>Min</i>	500	400	300
Apparent porosity, percent by volume, <i>Max</i>	16	18	20
Permanent linear change, percent, <i>Max</i>	1 450 °C 4 h, 0.2	1 450 °C 2 h, 0.5	1 450 °C 2 h, 0.5

NOTE — In the case of Type 1 refractories for bottom blocks of size over 345 mm, the cold crushing strength and apparent porosity requirements shall be as agreed to between the purchaser and the manufacturer.

6.2 In the case of refractories to be used as stack lining, the material shall be subjected to carbon monoxide disintegration 100-h test as per IS : 1528-1962* without any sign of disintegration of test piece.

7. MARKING

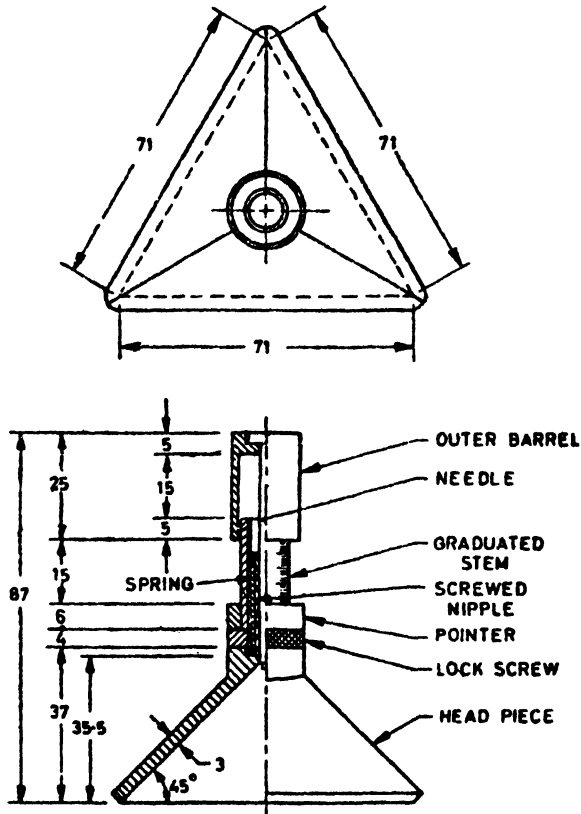
7.1 Each refractory brick or shape shall be clearly marked with the manufacturer's name or trade-mark and type of the material.

7.1.1 The brick or shape may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

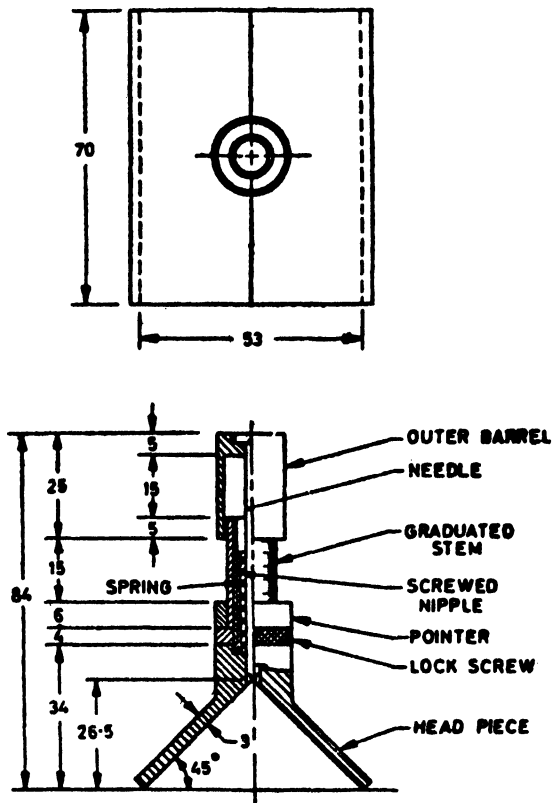
* Methods of sampling and physical tests for refractory materials, (Since revised and split into various parts).

APPENDIX A **(Clause 2.2.1, Note)** **DETAILS OF TYPICAL INSTRUMENTS**



All dimensions in millimetres.

FIG. 1 INSTRUMENT FOR CHECKING CORNERS



All dimensions in millimetres.

FIG. 2 INSTRUMENT FOR CHECKING EDGES

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones: 323 0131, 323 3375, 323 9402

Fax : 91 11 3234062, 91 11 3239399, 91 11 3239382

Telegrams : Manaksanstha
(Common to all Offices)

Central Laboratory:

Plot No. 20/9, Site IV, Sahibabad Industrial Area, Sahibabad 201010

Telephone

8-77 00 32

Regional Offices:

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 323 76 17

*Eastern : 1/14 CIT Scheme VII M, V.I.P. Road, Maniktola, CALCUTTA 700054 337 86 62

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022 60 38 43

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113 235 23 15

†Western : Manakalaya, E9, Behind Marol Telephone Exchange, Andheri (East),
MUMBAI 400093 832 92 95

Branch Offices::

'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001 550 13 48

‡Peenya Industrial Area, 1st Stage, Bangalore-Tumkur Road,
BANGALORE 560058 839 49 55

Gangotri Complex, 5th Floor, Bhadbhada Road, T.T. Nagar, BHOPAL 462003 55 40 21

Plot No. 62-63, Unit VI, Ganga Nagar, BHUBANESHWAR 751001 40 36 27

Kalaikathir Buildings, 670 Avinashi Road, COIMBATORE 641037 21 01 41

Plot No. 43, Sector 16 A, Mathura Road, FARIDABAD 121001 8-28 88 01

Savitri Complex, 116 G.T. Road, GHAZIABAD 201001 8-71 19 96

53/5 Ward No.29, R.G. Barua Road, 5th By-lane, GUWAHATI 781003 54 11 37

5-8-56C, L.N. Gupta Marg, Nampally Station Road, HYDERABAD 500001 20 10 83

E-52, Chitaranjan Marg, C- Scheme, JAIPUR 302001 37 29 25

117/418 B, Sarvodaya Nagar, KANPUR 208005 21 68 76

Seth Bhawan, 2nd Floor, Behind Leela Cinema, Naval Kishore Road,
LUCKNOW 226001 23 89 23

NIT Building, Second Floor, Gokulpat Market, NAGPUR 440010 52 51 71

Patliputra Industrial Estate, PATNA 800013 26 23 05

Institution of Engineers (India) Building 1332 Shivaji Nagar, PUNE 411005 32 36 35

T.C. No. 14/1421, University P. O. Palayam, THIRUVANANTHAPURAM 695034 6 21 17

*Sales Office is at 5 Chowringhee Approach, P.O. Princep Street,
CALCUTTA 700072 27 10 85

†Sales Office is at Novelty Chambers, Grant Road, MUMBAI 400007 309 65 28

‡Sales Office is at 'F' Block, Unity Building, Narashimaraaja Square,
BANGALORE 560002 222 39 71